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ABSTRACT

Connecticut has adopted a moderate approach to communications infrastructure modernization, covering a 4-year implementation period from 1993 to 1996. The state's remote educational framework, with regulatory enhancements, will allow the state to be technologically competitive with neighboring states as it allows subscribers to use evolving technologies. The Connecticut State Department of Public Utility Control has recently embarked on this regulatory structure to facilitate quality of instructional programming for the state's 26 cable franchise operators (CATV) and other telecommunications (TELCO) operators. The state has progressed from having no regulatory policy on remote educational policy to adopting regulations compelling implementation of quality standards and making information available on the extent and magnitude of instructional programming, as well as assessing the significance of interconnecting institutions across the state. What remains unclear in Connecticut is the cost allocation for the remote educational programs. It remains to be seen how operators will allocate costs corresponding to distance learning. Formation of the statewide informational distance learning network will produce positive outcomes that include increased teacher professionalism, expanded understanding among members of the educational community, and overcoming barriers to learning. Three tables illustrate the discussion. (SLD)

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Federal/State Regulatory Enhancement, Cost Allocation, and CATV/TELCO Distance Learning Initiatives in Connecticut

ED 365 291

A Paper Presented at the Michigan State University
Conference in Public Utility Regulation
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Colonial Williamsburg, Virginia

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U.S. DEPARTMENT OF EDUCATION
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)"

Connecticut's utility franchising authority, the Department of Public Utility Control (DPUC or Department) has recently embarked on a regulatory structure to facilitate quality of instructional programming for the state's 26 cable franchise operators.1 A listing of franchise operators is provided in Table B. The regulations are the integral component of a regulatory framework the DPUC is constructing to mandate the provisioning of remote educational communications. Connecticut has not currently adopted a formalized plan for providing distance education programming.2 Various independent, private educational programming producers as the Talcott Mountain Science Center transmit educational programming, in Talcott Mountain's case, science programming known as **Scistar**, which is delivered across microwave networks with financial support from participating school systems.3

The DPUC's recently adopted regulations on quality of educational programming clearly state:

> The Department may renew a franchise for a term of not more than 15 years if the franchise holder has commited itself....to maintain technologically advanced equipment and facilities....and make available the facilities and equipment necessary to enhance and promote technologically advanced educational programming.4

The overarching objective of the recently adopted regulations was to effectuate the Department's compliance with Public Act 92-146, which specifies that the DPUC evaluate cable franchise operators' commitments to upholding and to implementing quality of educational programming standards when the Department is determining appropriate length of franchise term as part of franchise renewal proceedings.5 Specifically, Public Act 92-146 required the Department to adopt regulations governing the quality of instructional programming in conjunction with the Joint Committee on Educational Technology, a standing committee whose purpose is to develop and to maintain plans and recommendations for the coordinated uses of educational technology.

On April 28, 1993, the DPUC formally adopted regulations on quality standards for instructional and educational programming, setting the stage for eventual formation and gradual implementation of a statewide network of educational communications. Those regulations state:

> ....the technical quality and reliability of the instructional channel pursuant to ....and any other public, educational, or governmental access channel available for educational programming....available to all subscribers....and technical assistance provided to educators, educational institutions, and educational agencies in the franchise area....7

The Connecticut General Assembly this past April enacted legislation requiring as of January 1, 1994, each cable franchise operator make available services and equipment to transmit educational programming to all public and private franchise area schools, the concomitant costs to be borne by the respective operators. Cost allocation specifics are not yet specified, and are to be determined by the franchise area municipalities. The objective is to construct regulatory scaffolding to establish in Connecticut coaxial and fiber optic interconnections between and within franchise territories for the purpose of facilitating bi-directional educational programming. A listing of the state's Interoffice Fiber Optic Spans is provided in Table A. The DPUC has recently initiated a docketed proceeding to assess and define to what extent and in what manner the legislation should assess both the technological feasibility and the economic manifestations of mandating statewide interconnections among the state's educational institutions.

The legislation was signed into law by the governor on June 10 in a substantively modified format. As presently codified, the new law requires a feasibility study to be conducted under the auspices of the Department, the purpose of which will be to assess:

> ....the feasibility of community antenna television companies providing two-way transmission of educational or instructional programming or information within a franchise area and interconnecting to provide such programming or information between (and among) franchise areas. The Department shall submit its findings....on or before February 1, 1994.8

The Department is to submit its findings to the Energy and Public Utilities Joint Standing Committee by the February deadline.

Many Connecticut cable franchise operators have recently begun to implement their own educational or institutional networks, ("I-Nets") and the new legislation seeks eventually to connect them statewide. Time Warner Entertainment, a subsidiary of Time Warner, the nation's second largest multiple systems cable operator, recently filed an application with the Department that includes a distance learning provision that if approved, would facilitate audio and video interaction among participating school systems and among the regional school districts.9 Such a proposal is consonant with the several hundred distance education proposals being filed with franchising authorities throughout the country from the public school level to the industrial school, college and university ranks.10 The Time Warner Entertainment proposal stresses the potential benefits of a remote educational protocol with applications to health care, government, and to business. STATENET, Connecticut's high-speed digital, fiber-optic network designed to accommodate communications among the state's various offices and agencies may eventually facilitate and support educational applications requiring speed data, voice, and imaging.11 The Time-Warner remote learning paradigm is typical of the extant wave of distance education programs that local and state governments are mandating that exceed the basic public, educational, and governmental regulatory access requirements.

Remote education is philosophically linked with the concept of the "social contract" in which right action is defined in terms of standards that that have been critically examined and accepted by the whole society. A regulated company thus agrees to a freeze on the "basic" services in return for less stringent regulation or of other less essential services.12 This idea may be traced to ancient philosophy and on through enlightenment thinkers such as Locke, Rousseau, and Kant.13 This thinking is operationalized in the provisioning of a service by an identified provider to ensure the greatest benefit for the greatest number, in this case, educational programming benefitting the entire society.

Since Congress approved cable television re-regulation in April, 1993, potential service providers have included remote educational provisioning in their respective proposals to the Department. FiberVision Corporation of Greater Hartford, in its July, 1993, filing with the DPUC, for example, has included a commitment to install fiber-optic cable to nodal areas comprised of 500 or more householders.14 This strategy will facilitate the capability for for bi-directional educational services, as well as to push fiber ever closer to the customer.15 By themselves, cable systems are poorly designed for interactivity, since additional amplifiers and special filters to separate signals are needed for two-way transmissions. Fiber is the key interactive element. Coupled with the incipient use of digital compression technology, or the ability to cram more channels into the traditional 6 megahertz (MHz) bandwidth, existing coaxial cable plant will become an expedient medium for transmitting interactive, full-motion educational programming in real time.17 The recent application by FiberVision Corporation with its concomitant plan for interactive learning is just one more application and example of cable television's inexorable progression to full-service network offerings.16 Contingent upon the particular compression model used, such as video signal compression or signal multiplexing, the necessity for large bandwidth spectrum is eliminated.17 Architecture between 550 and 750 MHz bandwidth will effectuate sufficient capacity for the provisioning of a wide range of interactive services.

As previously noted, the Connecticut Legislature has charged the DPUC with supervising a feasibility study on the efficacy of establishing public, interactive, educational programming between and among franchise operators and with reporting these findings to the joint standing committee on Energy and Public Utilities by February 1, 1994. Public Act 91-30 has further delimited the focus of the educational technology study to:

> ....(include) but not limited to: (a)(1) Computer assisted instruction; (b)(2) information retrieval and transfer; (c)(3) data communications; (d)(4) televised delivery of education programs, including cable....(f)(6) the instructional uses of television and other technologies.18

Balanced on this regulatory scaffolding is a distance education framework the DPUC is working to complete. Any extant or potential cable franchise operator applying to the Department for a certificate of public convenience and necessity to provide service must now demonstrate in its proposals the ability to establish and to maintain quality standards for the statutorily mandated educational and instructional channels.

Connecticut's regulatory initiatives regarding the providing of remote educational programming are commensurate with the Clinton Administration's push for the eventual creation of informational data superhighways as envisioned by the National Competitiveness Act of 1993. The objective of that legislation is to improve the country's ability to create jobs and to upgrade workers' skills by using evolving fiber technology, in what has become a technological cause celebre.19 Since Connecticut's 1992 adoption of its own administrative regulations for extending or transferring cable franchise operators' certificates of public convenience and necessity, the state now compels franchise operators to address the franchise community's cable-related needs and interests in the company's programming and signal carriage. Connecticut's 1992 regulations on cable franchise renewals specified that cable companies include ethnic programming in their channel line-ups, particularly for black and Hispanic subscribers. These regulations also broached the issue of quality of educational programming that was more finely tuned in the previously mentioned regulations concerning educational programming.20 With its proceeding on the economic and technical feasibility of operators to transmit interactive, full-motion and real time educational programming, Connecticut's franchising authority has positioned distance education to be coincident with federal initiatives such as Star Schools and the National Competitiveness Act of 1993.

Connecticut's STATENET architecture may figure in the eventual carriage of informational and educational programming across cable franchise boundaries in a manner similar to larger states' initiatives, such as Minnesota's Statewide Telecommunications and Routing System.21 As Connecticut's legislature brings the DPUC into compliance with Public Act 92-146, the DPUC in turn is mandated to compel franchise operators

to commit to establishing and for implementing in their applications quality criteria for instructional programming. This new regulatory criterion will be an important legal indicant of past performance in future proceedings when determining such matters as length of franchise term or extension of distribution plant and equipment.

Connecticut's evolving educational regulatory framework is arriving at a time when the cable television subscriber is being immersed in a complex context of high-speed, two-way communications offering a myriad of interactive services. Cable operators are spending billions to deliver various leading edge technologies such as Videotext and Internet, an informational pathway to millions of computer users world wide that would circumvent the user's need to access the local telephone company's lines.22
It is also becoming evident that the cable industry has built the foundation for the country's broadband telecommuncations infrastructure. It is not clear, however, as to the development and implementation of an advanced national telecommunications infrastructure. The FCC has recently suggested, for example, that municipal and state policy makers may be best suited to effectuate the implementation of the new communications services, including the distance education protocols.

Connecticut has progressed from having no regulatory policy on remote educational programming to adopting regulations compelling operators to develop and implement quality standards, to report to local school superintendents on the availability, extent, and magnitude of instructional and educational programming and lastly, to assess the economic, technological, and practical significance of interconnecting educational institutions across the state. What remains unclear in Connecticut is cost allocation for the remote educational programs.

Remote education serves the social contract since in providing the instruction, the cable operator enhances the shareholders' investment by increasing the value of the facilities. Any access fees concomitant with the educational programming will flow from the potential competitor to the monopolist; the monopolist locks out possible rival private

educational service providers, and all cable subscribers paying for the benefits associated with distance education pay for the social utility of the entire franchise community. It remains to be seen how each operator will allocate its costs corresponding to distance learning beyond the standard expensing of outside distribution plant and equipment amortized through the operator's normal depreciation schedules. It also remains for public institutions to determine and to ultimately effectuate the funding responsibility for the remote educational networks; whether these mechanisms be conventional amortization schedules or more innovative cost-shedding, off-budget scheduling procedures.26

In adopting regulations compelling franchise operators to specifiy quality standards for instructional programming, the burden of articulating these desiderata rests with the operator. No franchise has yet codified the standards since the Department's adoption of them. Presently, the DPUC believes that it is the responsibility of the cable franchise operator to address the educational needs of its community through the provisioning of facilities and equipment necessary to realize technologically advanced educational programming. The state's regulatory scaffolding is shaping communications technologies in order to promote educational objectives in divergent ways. The state's educational programming infrastructure continues to develop concomitantly with the current regulatory emphasis on the maintenance of an educated and well-trained workforce.

The National Telecommunications and Information Administration pointed out in a recent comprehensive study of the nation's communications infrastructure that the benefits that a modernized communications infrastructure would facilitate extend beyond the realm of economic development.27 As Connecticut continues to upgrade its communications pathways under the regulatory guidance of the DPUC, interconnection of remote educational protocols across geographic cable franchise boundaries will help to identify and to serve non-traditional students and to offer to employees the availability of enhancing job skills without having to return to the restrictions of a traditional academic environment.

The question of cost allocation for remote educational protocols has remained problemmatic in view of the Department's legal reticence to enter the business of determining the distance education largesse for the various franchise operators and their municipalities. The Department has taken the position that various costs for educational programming, production, and origination, including classroom equipment, personnel, and in-school technical support services are the responsibilities of the local educational communities of interest to articulate to the franchise operator. As the Department has stated:

> ....The Authority considers the outside plant and equipment items, such as fiber optic cable, laser projection devices, headend transmissions, and transmitters to be an integral part of the Company assets, which (Storer) is responsible for purchasing and maintaining.28

Connecticut's franchising authority for the time being will continue to balance the degree of regulatory guidance and direction it provides with the length of franchise term to be awarded. Specification of cost allocations for the present will remain between the franchise operator and the educational agencies, the intent being to position Connecticut's evolving distance education paradigms to extend their educational reach more deeply and meaningfully into individual lives.29 Outside assistance for implementing distance education programs will be needed, especially among smaller school districts. Particularly with the advent of digitially compressed packages of services, the expenses of expanding channel capacities and of offering higher system bandwidths will decrease. Digital compression technology will drive down the costs of distance education, since transmission costs will be lowered to a certain extent, as economies of scale and scope eventually develop as the technology evolves and is perfected.

Connecticut's current legislative and regulatory impetus on the provisioning and interconnecting of remote educational protocols coincides with recent regulatory action concerning gradual upgrading and modernization of the state's communications infrastructure.30

Connecticut's proposed infrastructure modernization commitments will strive to enhance development of a statewide communications network, help stem the present workforce exodus from the state, facilitate distance education, and will promote real economic growth for the state while continuing to provide quality public, educational, and governmental services for all.

The current decade is fraught with the proliferation of high quality, high speed, wide area digital services.31 These new wide area network offerings are an integral component for multimedia, the key being to match the application to a given service's costs and capabilities. Low bandwidth connections with dial-up modems cannot support real time voice, video, and data transmission required for interactive distance learning. Connecticut's public utility regulators are seeking to effectuate a regulatory scheme that will eventually link the state with electronic informational superhighways that will facilitate both cable and local telecommunications services as those technologies continue to expand and to evolve.32 Microwave, for example, being a self-contained communications modality, can transcend line lease constraints and facilitate a complete application package at a cost efficient level. This is currently being done at the Northcentral Technical College in Waucau, wisconsin, where Kellog Foundation Grants have resulted in a microwave delivered, distance education protocol offering educational access to those who do not possess the capability to avail themselves of traditional educational access.33

As the Connecticut regulatory framework for the provisioning of distance learning develops, more advanced applications, such as MCI's Practical High Quality Distance Learning will be offered, as well as applications for government and for university markets.34 Communications services that allow colleges and universities to optimize access circuits are but a few of the developing remote educational protocols to be offered in the wake of the national communications infrastructure modernization programs.

The Department's decisions have begun to respond to educators' requests for assistance in establishing remote educational programs. For example, a recent DPUC order stated:

> The OCC (Office of Consumer Council) and the (cable company) Advisory Council have expressed support for the incorporation of distance learning programs for franchise area schools....The purpose ...is to ensure that the schools incorporate into their currcula what is already....on the cable system. as well as to find out more about their future needs.35

Connecticut's progressive regulatory distance learning framework is commensurate with such national initiatives as the Clinton Administration's National Competitiveness Act of 1993 and with Tele-Communications Inc. (TCI) nationwide project to spend $2 billion to employ fiber-optic cable in over 400 communities through the country by 1996, which includes provisions for distance learning.36 Given that TCI is the country's largest multiple systems cable operator makes this endeavor particularly significant. Cable television is today's broadband communications superhighway, because of coaxial cable capacity, increases in channel offerings, and the nascent proliferation of interactive media.37 The Department's historical philosophy as reflected in various decisions is that it is in the public interest for CATV service to be offered to all areas within a given franchise so long as doing so would not place an unreasonable financial burden on the Company or on its subscribers.38

The divestiture of the Bell system in 1984 has changed the essence of communications.39 Although Connecticut's dominant local exchange carrier still retains monopoly power on many of its services, the anticipated benefits of interexchange carriers competing in the local loop are many. With this competitive niche opening up in the next few years, it is conceivable that these carriers may begin providing educational services. Addditionally, the Department's eventual decision in its upcoming feasibility study will determine to what extent and in what manner remote educational systems will become interconnected.

Distance learning in Connecticut will be a key factor in maintaining the state's existing workforce and in attracting future high technological positions. The current administration continues to support the construction of an informational superhighway to which all Americans would have access. Bidirectional communication broadens the public's information access and creates a diversity of informational services. Two-way networks solve the difficulty of organizing and responding to informational flow. The preferred technology for interactive services is fiber optics, but that modality raises the issue of expense. Copper loops have limited transmission capability, despite the advent of digital channel compression technology.40

Connecticut has adopted a moderate approach to communications infrastructure modernization, covering a four year implementation period from 1993 to 1996. The state's remote educational framework, precipitated by regulatory enhancements, will allow the state to remain technologically competitive with its neighboring states while allowing subscribers to avail themselves of the evolving communications technologies, as the present administration's Information Infrastructure Task Force delineates the burgeoning federal strategy for constructing a national data superhighway.41

The formation of a statewide indormational distance learning network will produce several positive outcomes: increased teacher professionalism, expanded understanding among researchers, administrators, teachers, and students, greater opportunities for meaningful change through informational sharing, destroying beaurocratic barriers to learning, and transcending the spatial and temporal barriers to learning.42. The cable industry continues to move toward having interactivity become a functioning reality in American homes.43 The state's remote educational framework, precipitated by regulatory initiatives, will allow Connecticut to remain competitive with the rest of the country while allowing residents to partake in the use of the developing communications technologies.

NOTES

-i-

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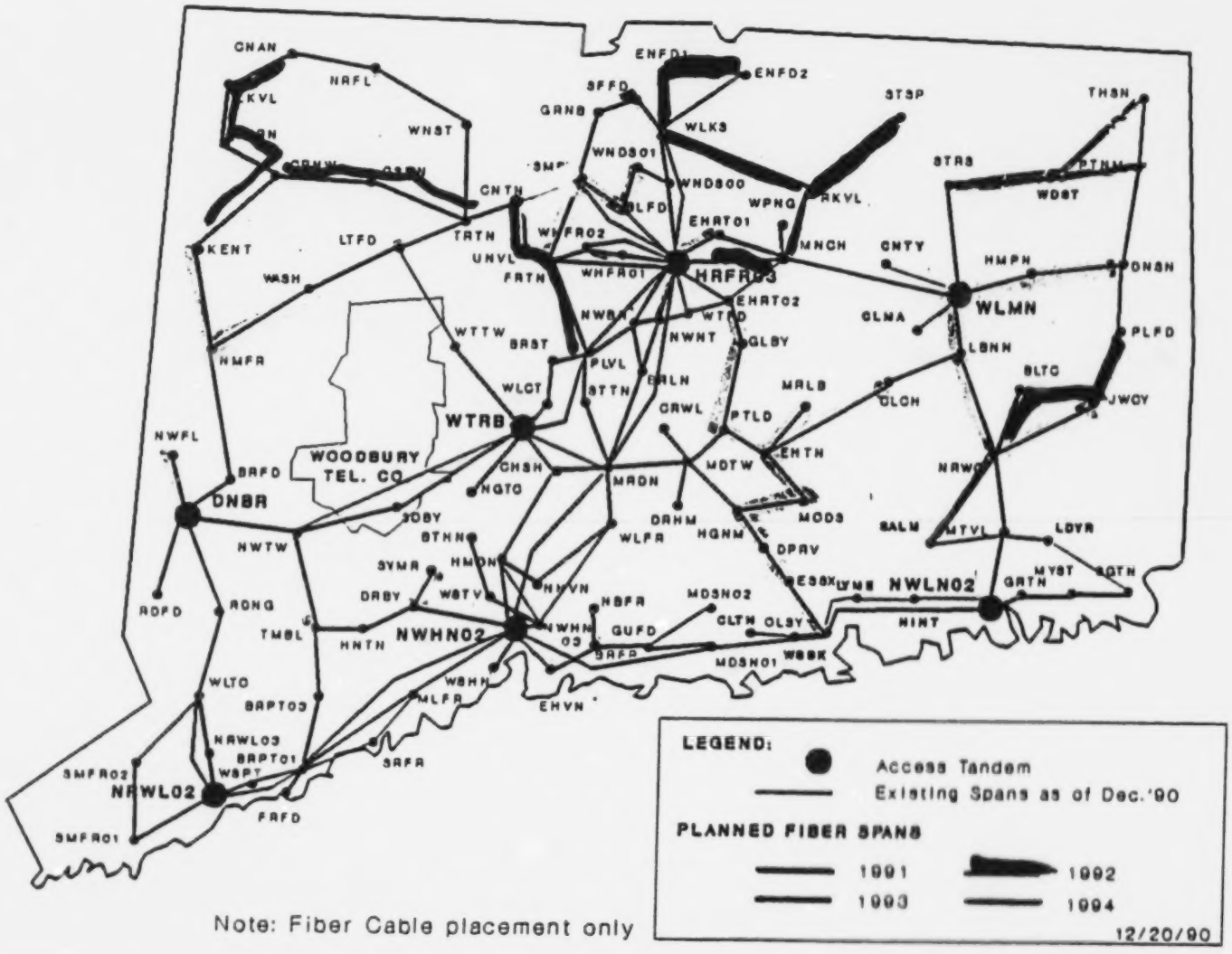
TABLE A

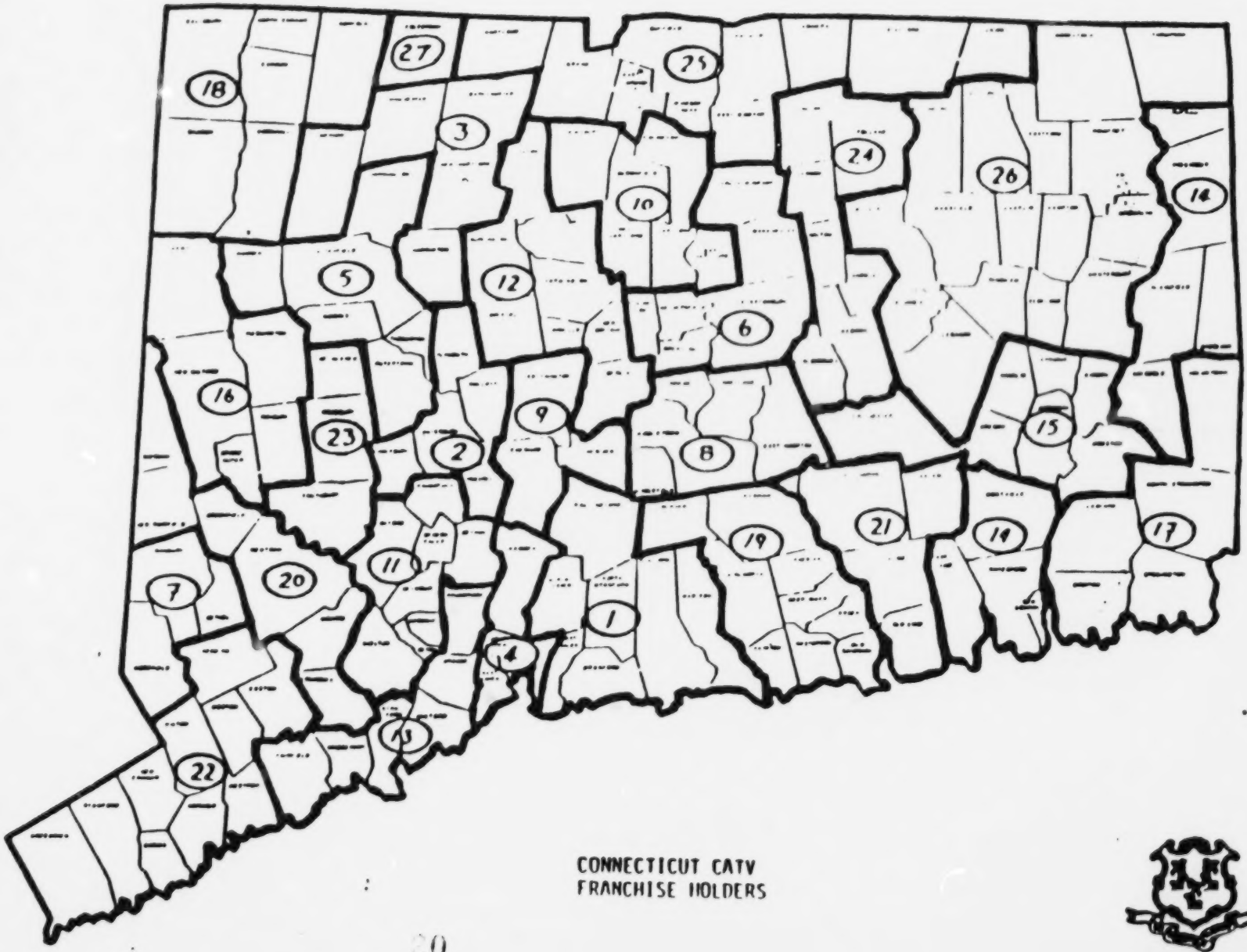
INTEROFFICE FIBER OPTIC SPANS



Note: Fiber Cable placement only

SOURCE: DPUC, 1990

TABLE B



CONNECTICUT CATV
FRANCHISE HOLDERS

BEST COPY AVAILABLE

SOURCE: DPUC, 1992

DEPT. OF PUBLIC UTILITY CONTROL
STATE OF CONNECTICUT
ONE CENTRAL PARK PLAZA
NEW BRITAIN, CONN 06051

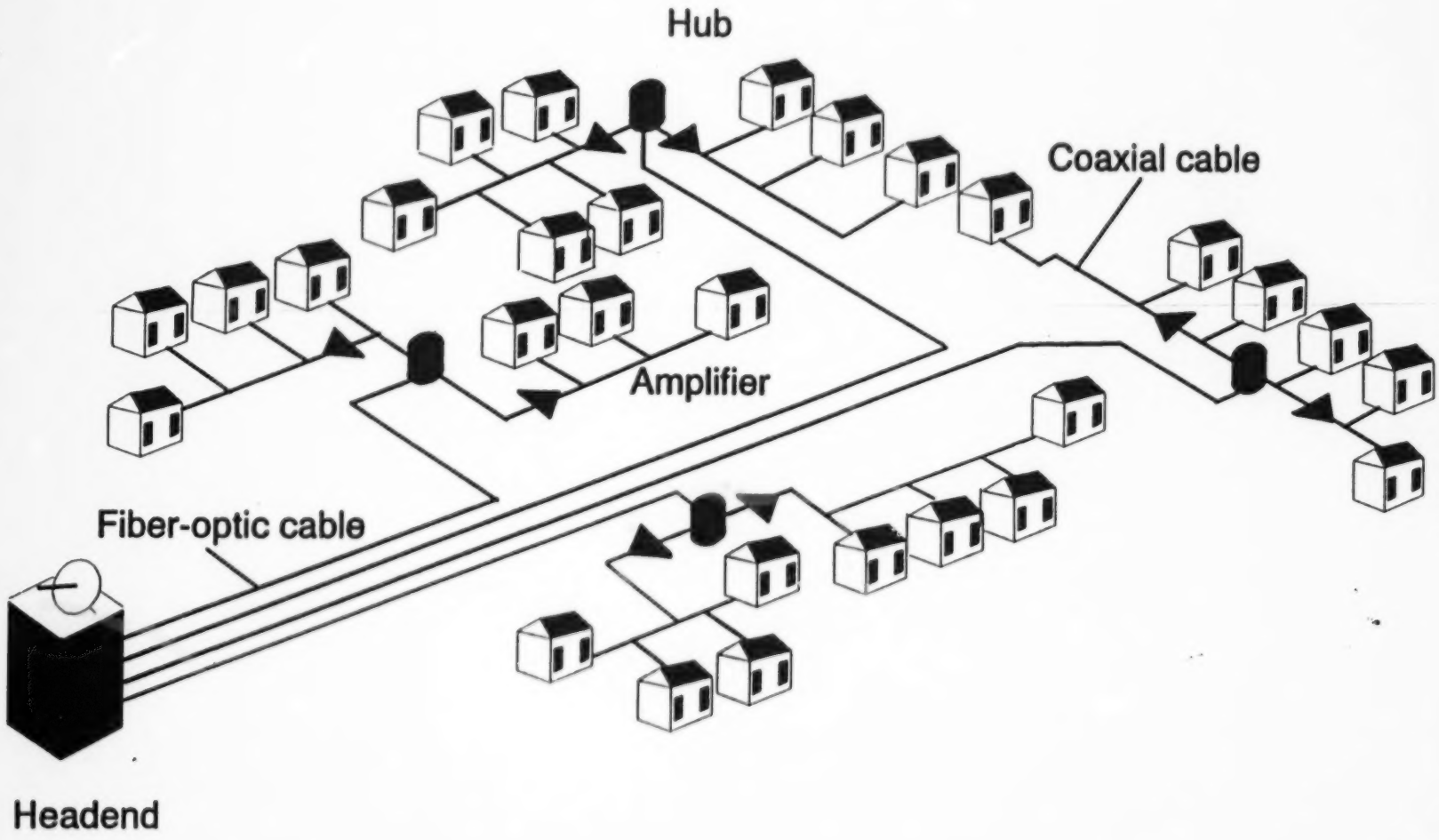
LEGEND to TABLE B

Cable TV Company Number	*Company Name*
1	TCI Cablevision of South Central CT
2	Sammons Communications
3	Pegasus Cable Television
4	Storer Communications of Groton
5	Laurel Cablevision
6	Cox Cable of Greater Hartford
7	Comcast Cablevision of Danbury
8	Comcast Cablevision of Middletown
9	Telesystems of CT
10	TCI Cablevision of Hartford
11	Tele-Media of Western (Valley)
12	TCI Cablevision of Central CT
13	Cablevision of Southern Connecticut
14	Eastern Connecticut Cable Television
15	Century Norwich Corporation
16	Crown Cable New Milford
17	Storer Communications of Groton
18	TCI Cablevision of Northwestern CT
19	Storer Communications of Clinton
20	Crown Cable-Housatonic
21	Century Cable Management Corporation
22	Cablevision of Connecticut
23	Crown Cable Mid-CT
24	TCI Cablevision of Eastern Connecticut
25	Continental Cablevision
26	Tele-Media of Northeastern CT

Source: DPUC, 1993

TABLE C

Figure 2.2. Fiber-Optic Star Configuration.[1]



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